

DescriptionRUDDER WITH CONTROLLABLE TAB5   Technical Field

          This invention relates to a rudder which is principally designed for use with a boat, and more particularly, to a rudder, including an internal, independently controllable tab or spoiler to alter the flow  
10 of fluid moving past the base of the rudder.

Background of the Invention

          The trim tab on the trailing edge of boat rudders and spoilers on airplane wings have been known for  
15 a long time. These devices are used to alter the flow of fluid passing thereby to alter the traveling characteristics of the vehicle.

          Examples of known prior art include:

          U.S. Patent No. 2,275,618, granted to Edwards  
20 March 10, 1942, teaches the value of refinements in the internal shape of a nozzle which contains a ship's propeller. These downstream diversions alter the fluid flow and thus the cruising characteristics of the ship.

          U.S. Patent No. 2,993,464, granted to Conover  
25 July 25, 1961, teaches the concept of an add-on torque compensator for an outboard motor.

          U.S. Patent No. 3,919,965, granted to Ross  
November 18, 1975, teaches the utilization of a trim tab attached to a propeller assembly mounted forward of the  
30 transom of the boat wherein the separate propeller mechanism is rotatable about a vertical axis and includes a trim tab.

          U.S. Patent No. 3,943,878, granted to Kirkwood  
et al March 16, 1976, teaches the utilization of a power  
35 assist for rotating a boat motor about a vertical axis provided by a small rudder mounted along the center line of

the motor and positioned in a vertical plane which passes through the axis of the propeller and shaft.

U.S. Patent No. 4,051,801, granted to Woodfil et al, October 4, 1977, teaches a trim used in conjunction  
5 with a water drive jet.

U.S. Patent No. 4,693,689, granted to Harada September 15, 1987, features the use of a rotatable trim tab secured to the lower assembly of an outboard motor, said trim tab being rotatable about a vertical axis.

10 U.S. Patent No. 5,746,147, granted to Carnevali May 5, 1988, teaches the utilization of an adjustable trim at the trailing edge of a rudder countering the torque generated by the propeller.

#### 15 Summary of the Invention

With the above-noted prior art in mind, it is the purpose of this invention to provide a boat rudder which is rotatable about a vertical shaft and having within the confines or perimeter of the boat rudder a trim tab or  
20 spoiler which is selectably rotatable by a second shaft which is co-axial with the shaft which controls the rudder.

A further purpose of the present invention is to provide a means mounted within the outer profile of a device used to deflect fluid for interrupting the fluid  
25 flow thereby.

#### Brief Description of the Drawings

Figure 1 is an isometric view of the inventive rudder and included trim tab means.

30 Figure 2 is a side elevational view of the rudder of Figure 1.

Figure 3 is a top plan view of the rudder of Figure 1.

Figure 4 is an enlarged exploded view of the  
35 upper portion of the rudder of Figure 1.

Figure 5 is sectional view along line 5,5 of Figure 2.

Figure 6 is a plan view of the rudder of Figure 1, with the control tab moved out of the plane of the main rudder and depicting the interrupted fluid flow thereby.

Figure 7 is an elevational view of an alternate  
5 embodiment of the present invention.

Figure 8 is an enlarged view showing the intersection of the vertical shaft and the horizontal push rod.

Figure 9 is an enlarged view indicating the  
10 interaction between the push rod and the tab or spoiler.

Figure 10 is a view similar to Figure 9 with the trim tab or spoiler in the neutral position.

#### Best Mode for Carrying Out the Invention

15 As seen in Figure 1, there is depicted a boat rudder 2 particularly designed and adapted for use in high speed, water ski boats having a leading edge 4, a pair of mirror image faces 6, a configured trailing edge 8, which is somewhat thinner than the leading edge 4. Also seen in  
20 this view is a flared upper portion 10 of the rudder to accept a vertical control shaft 12, which although not part of this invention, is connected to a steering mechanism within the boat.

Further to be seen in this view and as explained  
25 hereinafter, is a trim tab or spoiler 12, which is mounted for movement about a vertical shaft relative to the rudder 2. Further, as seen in Figure 2, a co-axial internal shaft 16 is rigidly connected to trim tab or spoiler 14, permitting the independent rotation thereof.

30 Reference is now had to Figure 4, wherein the device is shown in an exploded view, and it can be seen that the hollow shaft 12 is pinned to the rudder 2 by means of a pair of co-axial opposed pins 18, and further that the opening 20 cut in the main body of the rudder 2 has  
35 essentially the same profile as the main rudder has, and further, that the trim tab or spoiler 14 is pinned to shaft

16 by means of pin 22. It is to be understood that the particular shape of the trim tab is somewhat arbitrary.

As seen in Figure 5, tab 14 and opening 20 cannot be perfectly symmetrical because of the thickness of 14, and therefore, either the edges of the opening must be concave or in the alternative, the tab edge could in fact be rounded to permit relative rotation.

As seen in Figure 6, the displacement of the tab 14 from the general plane of the rudder 2 creates a turbulence in the water, thereby reducing the impact upon the displaced side of the rudder. This displacement can be used for fine tuning the boat in operation to compensate for torque created by the propeller itself or perhaps to address a drifting caused by imperfections in the hull of the craft itself.

Reference is now had to Figure 7 wherein it can be seen that the internal shaft 16, rotatably mounted within hollow shaft 12 secured to the rudder 6, terminates below the shaft 12 and controls trim tab 24 mounted to vertical shaft 26 by means of a push rod 28, which is continuously urged toward the control shaft by means of a spring 30.

Reference is now had to Figure 8, wherein the bottom portion of vertical shaft 16 includes a cam portion 32 which reacts against a bolt mounted to the end of push rod 28 and controls the movement of push rod 28 against the compression spring 30.

As seen in Figure 9, the push rod 28 includes a cross pin before which extends outwardly and interacts with a pair of vertical pins 36, secured to the lower portion of trim tab 24, such that when the push rod 28 moves in a horizontal direction, it causes the tab 24 to respond and rotate accordingly.

Figure 10 is the trim tab in the retracted or neutral position.

Thus, as can be seen, the present invention allows the fine tuning of a boat, and in particular a high

speed ski boat, to adjust the tab or spoiler in such a manner as to cause the boat to run true.